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(54) Name of the utility model THROAWAY TIP

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(72) Inventor Keiji Handa % Itami Factory, Sumitomo Electric Industries Ltd.  
1-1-1 Konyo-Kita, Itami-shi

(72) Inventor Masafumi Hidesima  
% Itami Factory, Sumitomo Electric Industries Ltd.  
1-1-1 Konyo-Kita, Itami-shi

(71) Patent Applicant Sumitomo Electric Industries Ltd. 5-15 Kitahama, Higashi-ku,  
Osaka City

(74) Agent Bunji Kamata, Patent Attorney

**Description**

**1. Title of the invention**

THROWAWAY TIP

**2. Claim of the utility model**

A positive-type throwaway tip, wherein one portion or all of the cutting blade, in which the upper surface and the side surface intersect each other, has a circular-arc shape blowing up toward outside with respect to the planar view thereof, which is characterized in that a flat side surface intersecting with a bottom face at right angles is formed at a lower part of a slanted side surface, and said vertical side surface is arranged along a vertical and flat seat wall of a tip seat formed in a body of a tool.

**3. Detailed description of the utility model**

**(a) Field of invention**

The present invention relates to an improved throwaway tip to be used with a ball end mill or a radius ball end mill.

**(b) Conventional art and the problems**

A throw away tip to be attached to the aforementioned rotary cutting tool has a circular-arc shaped cutting blade, and generally a positive-type tip, i.e., a tip with a side face intersecting the rake face at an acute angle, has been used to secure a good bite.

**Publication of the Application for Utility Model Registration (U) Showa 60-22218 (1985)**

Figures 1 and 2 show one example of the tip, whose original shape is approximately rectangular with respect to the planar view thereof; the curvilinear blade 2b having the continuous linear blade part 2a at the diagonal corners is formed and the side surface thereof is intersecting the rake face (top surface) at an acute angle and intersecting the bottom surface at an obtuse angle.

In the cutting tool to be used with the aforementioned tip, it is necessary to form a tip seat with a slanted seat wall having a circular-arc shape in the tool body 6 as shown in Figures 3 and 4; it is possible to form the seat wall 7 so as to have a similar shape as that of the side surface of the tip; however, it is extremely difficult to fabricate the seat so that the tip can be completely attached firmly to the seat; thus the fabricating cost will be high and there are many risks that the supporting state of the tip becomes unstable or the cutting precision becomes deteriorated.

**(c) Means to solve the problems**

To resolve the above-mentioned problems, the present invention is to provide a throwaway tip wherein a flat side surface intersecting with a bottom face at right angles

**Publication of the Application for Utility Model Registration (U) Showa 60-22218 (1985)**

is formed at a lower part of a slanted side surface, and said vertical side surface is arranged along a vertical and flat seat wall of a tip seat formed in a body of a tool. According to the present invention, since it is only necessary to form the seat in a tool in a linear flat face the fabrication of the tip seat can be simplified and the supporting state of the tip can be stabilized.

**(d) Embodiment of the invention**

Figures 5 to 7 show the improved example of the throw away tip as shown in Figure 1; the point-symmetric-shaped cutting blade 12 is formed at the bottom part of the slanted side surface 13 of the tip 11 consisting of the linear blade 12a and the curvilinear blade 12b continuing therefrom and the 2 pairs of flat side surfaces 13a, 13b orthogonal to the bottom face 15 that are intersecting each other at almost right angles with respect to the planar view thereof are formed at respective 2 diagonal positions. The side surfaces 13c, 13d connecting the side surfaces 13a and 13b at opposing diagonal positions respectively are also formed so as to be flat and orthogonal to the bottom face; however, these side surfaces may be omitted. That is to say, at these sites, the slanted side surfaces may be extended as they are to the bottom face.

The tip 11 having the above-mentioned configuration, may be attached firmly to

**Publication of the Application for Utility Model Registration (U) Showa 60-22218 (1985)**

the body of the tool as shown in Figures 8 and 9 by such a manner that a tip seat comprising a seat face 17 to which the bottom face of the tip is firmly attached and straight seat walls 18, 19 which is orthogonal to the seat face and to constrain the flat side surface 13a, 13b of the tip is formed and the tip is attached thereto by a screw and the like.

Figures 10 and 11 show an improved example of a tip 12' wherein all cutting blades have circular-arc shapes and the lines connecting neighboring apexes form an equilateral triangle. There is also formed the flat side surface 13a' orthogonal to the bottom face 15' at the bottom part of the slanted side surface 13' in the tip 11'. The side surface 13' is configured so as to be firmly attached to the vertical seat walls 18', 19' contained in the tip seat of the cutter body 16 as shown in Figure 12.

Meanwhile, in tips wherein lines connecting the apexes form an equilateral triangle or other regular polygons, it is better to make the flat side surface parallel to the line connecting the apexes. However, this invention may be applied to any positive-type polygonal tip having the part or all of cutting blades are circular-arc-shaped; if the flat side surface is made parallel to the line connecting the apexes in a diamond-shaped

**Publication of the Application for Utility Model Registration (U) Showa 60-22218 (1985)**

or a parallelogram-shaped tip, the crossing angle of the side surface may be 50 degrees or less depending on the acute-angled corners of the tip; thus the strength of the tip may be deteriorated. Therefore, it is preferred for a flat side surface provided with a corner part having a crossing angle of 50 degrees or less to have a crossing angle of more than 50 degrees while ignoring the parallelism against the line connecting the apexes.

**(e) Effect of the invention**

As described above, according to the present invention, since the throwaway tip wherein a flat side surface intersecting with a bottom face at right angles is formed at the bottom part of the slanted side surface and the flat surface is configured so as to be firmly attached to the vertical seat wall in the tool body, the supporting state of the tip can be stabilized.

Furthermore, since the seat wall is linear, the fabrication thereof can be simplified and the accuracy can be also highly enhanced; thus the positioning accuracy of the tip can be also enhanced and the fabricating cost of the body can be reduced.

**4. Brief description of drawings**

Figure 1 shows one example of a conventional tip which can be the subject of the improvement, Figure 2 shows the side elevation of the conventional tip shown in Figure 1, Figure 3 is an elevation view of a tool to which the conventional tip is attached, Figure 4 is a sectional side elevation of the tool,

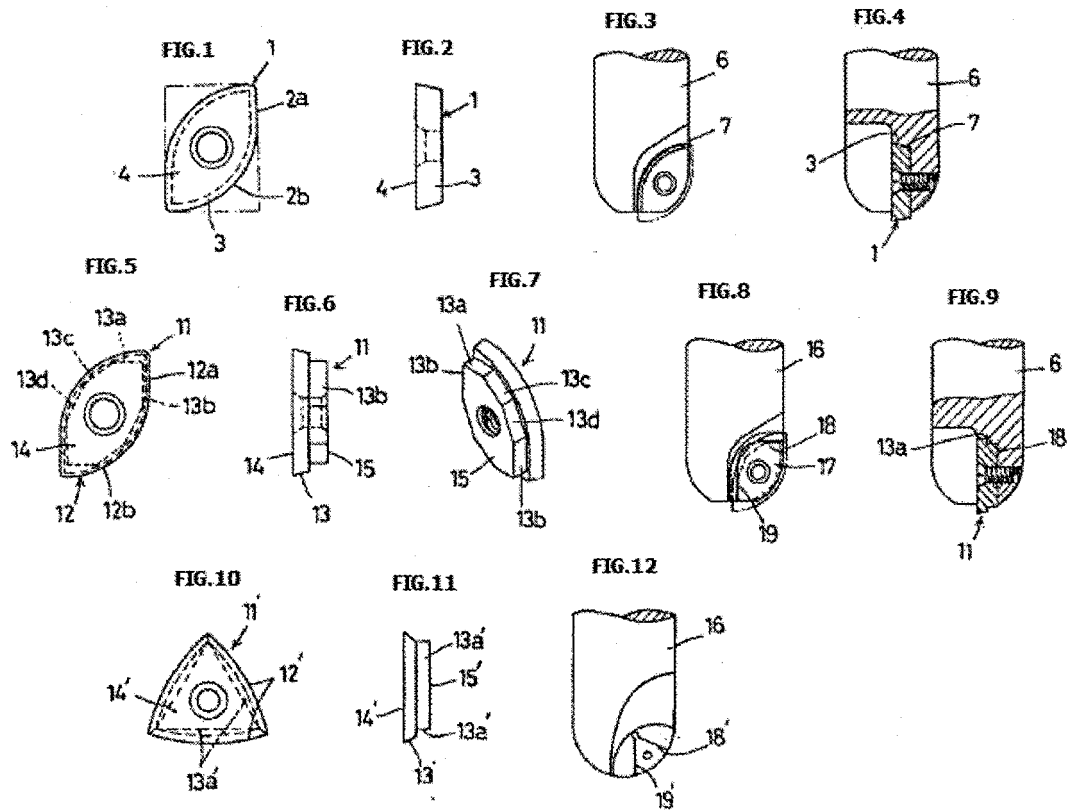
**Publication of the Application for Utility Model Registration (U) Showa 60-22218 (1985)**

Figure 5 is a plain view of one embodiment of the tip according to the present invention, Figure 6 is the side elevation of the tip, Figure 7 is a perspective view of the tip as seen from the bottom face side, Figure 8 is an elevation view of a tool to which the tip of the present invention is attached, Figure 9 is the partial side elevation of Figure 8, Figure 10 is an elevation view of another embodiment of the tip according to the present invention, Figure 11 is the side elevation of Figure 10, and Figure 12 is an elevation view of another embodiment of the tool.

11, 11'---throwaway tip, 12---cutting blade, 12a---linear blade, 12b---curvilinear blade, 13---side surface, 13a, 13a', 13b, 13b'---flat side surface, 14, 14'---rake face, 15, 15'---bottom face

Applicant of the utility model	Sumitomo Electric Ltd.
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Agent of the applicant	Bunji Kamata
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Agent of the applicant Bunji Kamata





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Telephone: (312) 759-9999 Facsimile: (800) 803-0676

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October 15, 2010

*I, Kagari Fujita, hereby certify that I am competent in both English and Japanese languages.*

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**[JP1985-22218\_English.pdf]**

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3

⑨ 日本国特許庁 (JP) ⑩ 実用新案出願公開  
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 ⑮ 出願人 住友電気工業株式会社 伊丹製作所内  
 ⑯ 代理人 住友電気工業株式会社 伊丹製作所内  
 ⑰ 審査請求 未請求 (全頁)

明 細 書

1. 考案の名称  
スローアウェイチップ

2. 実用新案登録請求の範囲

上面と側面との交差する切刃稜の一部又は全部を平面視において外側に膨らむ円弧状としたポジテイブ型のスローアウェイチップにおいて、傾斜した側面の下部に底面に対して直角に交わる平坦な側面を形成し、この垂直な側面を工具本体に形成したチップ取付座の垂直かつ平坦な底壁に沿わせるようにしたスローアウェイチップ。

3. 考案の詳細な説明

(1) 産業上の利用分野

本考案は、主としてボールエンドミル又はラジウスボールエンドミルに使用するスローアウェイチップの改良に関する。

(2) 従来技術とその問題点

前記の如き回転切削工具に取付けるスローアウェイチップは、円弧状の切刃を有し、また、良好な切味確保のため、通常、ポジテイブタイプの

(1)



もの即ちすくい面に対して鋭角に交わる側面をもつものが使用される。第1図及び第2図はその一例を示すもので、原形の平面視が略々長方形をなすチップ1の対角コーナー部に直線刃2aの連続する曲線刃2bが形成され、さらにその側面3はすくい面(上面)4に鋭角に、底面5に鈍角に交差している。

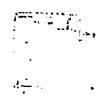
このようなスローアウェイチップを使用する切削工具においては、チップの側面支持のため、第3図及び第4図に示す如き工具本体6に、円弧状の傾斜した座壁7を有するチップ取付座を形成する必要があるが、座壁7は、チップの側面に近似した形状にすることは可能であつても、チップが完全に密着するように加工することは極めて難しく、従つて、工具の加工費が高くなり、しかもチップの支持状態が不安定になつたり、刃先精度に狂いを生じたりすることが多い。

(イ) 問題点を解決するための手段

本考案は、かかる問題を解決するべく、スローアウェイチップの傾斜側面の下部に底面に対し

(2)

164



て直角に交わる平坦な側面を形成し、この垂直な側面を工具本体に形成したチップ取付座の垂直かつ平坦な座壁に沿わせるようにしたものであり、これによれば、工具側の座壁を直線状の平坦面とすればよいのでチップ取付座の加工が容易になり、かつチップの支持状態も安定させることができる。

(ロ) 実施例

第5図乃至第7図は、第1図に示すスローアウェイチップの改善例を示すもので、点対称形状の切刃12が直線刃12aとそれに連なる曲線刃12bから成るチップ11の傾斜した側面13の下部に、底面15に対して直角に交わる平坦な側面13a、13bが平面視においてほぼ直角に交差して対角位置に2個所宛形成されている。対角位置の側面13aと13bとをつなぐ側面13c、13dも底面と直角な平坦面とされているが、この側面は省略することができる。即ち、この部位では傾斜した側面をそのまま底面部迄延長してよい。

以上の構成としたチップ11は、第8図及び第

(3)

165

9 図に示すような工具本体 16 に、チップの底面を密着させる座面 17 と、この面に対して直角でチップの平坦な 2 側面 13a, 13b を拘束するストリートな座壁 18、19 とを備えるチップ取付座を形成して、そこにねじ等を利用して固着すればよい。

第 10 図及び第 11 図は、切刃 12' が全て円弧で隣接の頂点を結ぶ線が正三角形をなすチップの改善例を示している。このチップ 11' も、傾斜した側面 13' の下部に底面 15' と直角で平坦な側面 13a' が形成されており、この側面 13a' を、第 12 図に示すように、カッタ本体 16 のチップ取付座に含まれる垂直な座壁 18、19 に密着させるようにしてある。

なお、頂点を結ぶ線が正三角形或いはそれ以外の正多角形をなすチップの場合、平坦な側面はチップの頂点を結ぶ線と平行にしておくのがよい。尤も、本考案は切刃の一部又は全体が円弧状となるポジティブ型多角形チップの全てに適用され、変形チップや平行四辺形チップにおいて平坦な側

(4)

166

面を頂点を結ぶ線と平行にすると、チップの鋭角コーナの角度いかによつては側面の交角が 50° 以下となってチップ強度を低下させることがあるので、交角が 50° 以下のコーナ部に設ける平坦な側面は、頂点を結ぶ線との平行度を無視して交角を 50° 以上とするのが望ましい。

#### 付 効 果

以上説明したように、本考案のスクローウエイチップは、傾斜した側面の下部に、平坦で底面に対して直角な側面を形成し、それを工具本体の垂直な座壁に密着して沿わせるようにしたので、チップの支持状態が安定する。

また、工具本体側のチップ取付座の加工も座壁が直線状であるので容易であり、しかもその座は高精度に加工できるのでチップの位置決め精度も向上し、本体の加工費の面でも有利となる。

#### 4. 図面の簡単な説明

第 1 図は本考案の改良対象となる従来チップの一例を示す平面図、第 2 図はその側面図、第 3 図は、上記のチップを装着する工具の正面図、第 4

(5)

167

図はその一部破断側面図、第5図は本考案チップの一例を示す平面図、第6図はその側面図、第7図は底面側から見た斜視図、第8図は本考案のチップを装着する工具の正面図、第9図はその一部破断側面図、第10図はチップの他の例を示す平面図、第11図はその側面図、第12図は工具の他の例を示す正面図である。

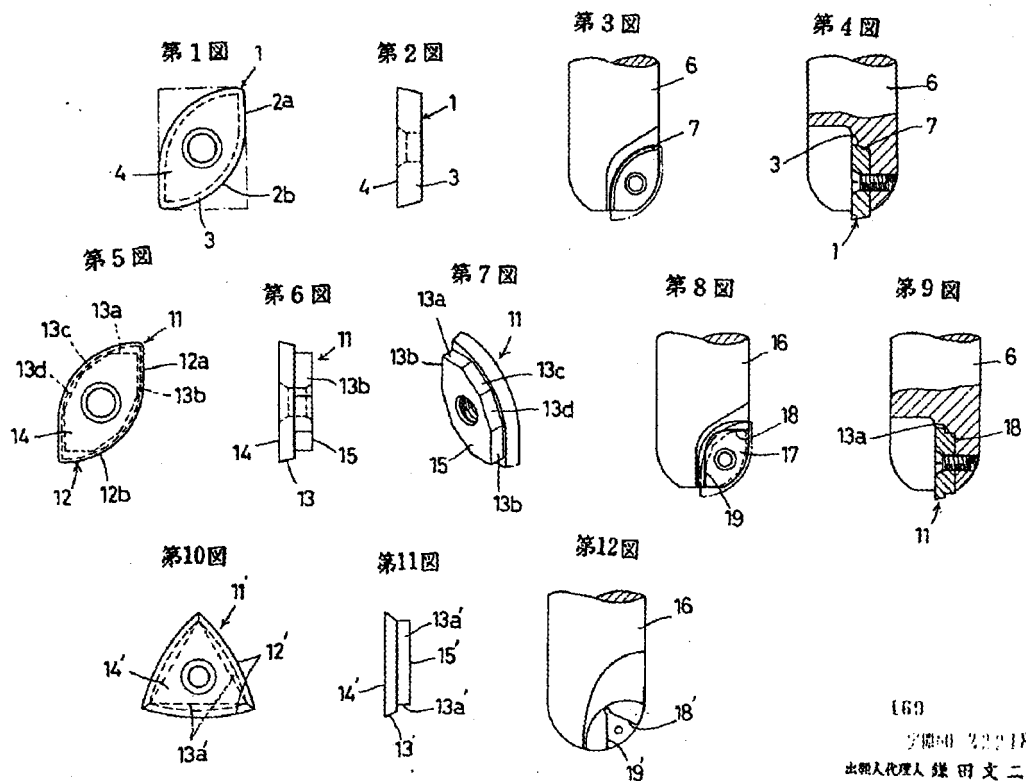
11, 11'...チップ、12...切刃、12a...直線刃、12b...曲線刃、13...側面、13a, 13a', 13b, 13b'...平坦な側面、14, 14'...すくい面、15, 15'...底面。

実用新案登録出願人 住友電気工業株式会社

代理人 鎌 田 文 二

(6)

168



169

実用新案 22218  
出願人代理人 鎌 田 文 二